SECTION 78

TANKS

78.1 REFERENCES

(78A) Code of Federal Regulations - 46 CFR Sub-chapter F

(78B) CENTER FOR DISEASE CONTROL (CDC) - *Recommended Shipbuilding Construction Guidelines for Cruise Vessels To Call on U.S. Ports*

(78C) UNITED STATES PUBLIC HEALTH SERVICE (USPHS), *Handbook on Sanitation Of Vessel Construction*

(78D) WORLD HEALTH ORGANIZATION, *Guide to Ship Sanitation*

78.2 INTRODUCTION

This Section contains the Contractor's Design and Provide general requirements for all tanks throughout the Vessel.

For WSF Fleet-wide Standardization purposes, End No. 1 of the Vessel shall always be considered the bow, and this designation shall delineate port and starboard, fore and aft wherever they are addressed in the Technical Specification.

78.3 GENERAL

The Contractor shall provide all tanks to support the Contractor's design, as listed in **TABLE 78-1** *List of Tanks*, and as specified herein. Double bottom and fabricated tanks shall comply to USCG requirements. Independent fuel tanks shall be fabricated and installed in accordance with 46 CFR §58.50. All tanks shall also meet the requirements of References (78A), (78B), (78C), and (78D), as applicable.

78.4 FABRICATION

Unless specified differently in the Technical Specification, all tanks shall be welded steel construction, with scantlings to suit the design head but of not less than 10.2# (¼") plate and in accordance with Section 2 of the Technical Specification. All tanks shall be fitted with all necessary penetrations for the fill and suction lines, tank sounding tube, vent lines, tank level indicators, and all other required penetrations as generally illuminated on the individual system Model Design drawings and required in the Technical Specification. All tanks will be adequately stiffened. Swash plates shall be used where required and will include limber and vent holes, top and bottom, to insure proper draining and venting. The swash plates shall be so designed to allow for easy cleaning and manual coating of the tank inside surfaces. Swash bulkheads shall be provided as specified in Section 2 of the Technical Specification. Interior tank adjoining plate faces forming an interior angle of less than 80 degrees shall be designed and fabricated with a six (6) inch inside radius at the plate edge.

Provide two (2) Sewage Tanks with an aggregate and individual capacity at least as set forth in **TABLE 78-1**. The tanks shall be made from 15.3# (⅜") plate in accordance with the Contractor's design and shall be constructed to provide an interior free of all stiffeners and braces. No fittings or piping, except that serving the respective tank, shall be inside of these tanks. The Sewage Tanks will have sloped bottoms with low-point sumps for suctions. The tanks shall be independent tanks.

Provide two (2) Potable Water Storage Tanks with an individual capacity at least as set forth in **TABLE 78-1**. The tanks shall be made from 15.3# (⅜") plate in accordance with the Contractor's design and shall be constructed to provide an interior free of all stiffeners and braces.. No fittings or piping, except that serving the respective tank, shall be inside of these tanks. The tanks shall be independent tanks.

Provide one (1) Hi-Fog Water Mist Fire Suppression System/Back-flush Fresh Water Storage Tank with an individual capacity at least as set forth in **TABLE 78-1**. The tanks shall be made from 15.3# (⅜" thick) plate in accordance with the Contractor's design and shall be constructed to provide an interior free of all stiffeners and braces.. No fittings or piping, except that serving the respective tank, shall be inside of the tank. The tank shall be an structural tank.

Where feasible, tanks will have sloping bottoms with plugged or capped, valved low-point drains.

Pressure tanks will be designed to meet all 46 CFR §54 regulations. ASME certification and stamping shall be furnished for each pressure tank as required. Tanks required to be galvanized shall be galvanized by the hot-dip process.

NOTE: For tank design purposes, all Maximum Allowable Working Pressure (MAWP) shall be at least twenty-percent (≥20%) over normal system working pressure.

Access manholes shall be provided as specified in Section 4 of the Technical Specification. Standard access covers shall be interchangeable.

Tanks shall be provided with interior and exterior access ladders as necessary for safe and adequate access to the tank.

Tanks shall be cleaned and coated as specified in Section 14 of the Technical Specification.

Tank level indicators shall be provided as specified in Section 71 and **VOLUME V**, *OWNER FURNISHED EQUIPMENT* of the Technical Specification.

Tank connections and tailpipes shall be compatible with the applicable piping system specification in Section 74 of the Technical Specification.

Tanks for the Stern Tube Lube Oil (LO), CCP Oil, Reduction Gear LO and Steering Gear LO Systems shall be provided with connections for the Mobile Oil Cleaning System as set forth in the *MOBILE OIL CLEANING SYSTEM* Subsection in Section 57 of the Technical Specification.

Tanks fitted with low level alarms shall be provided with swash plates as necessary to prevent movement of Vessel setting off the alarms. Alarms shall be provided as specified in Sections 71, 85, and **VOLUME V**, *OWNER FURNISHED EQUIPMENT* of the Contract, Technical Specification, and/or the system specification.

Vents, sounding tubes and overflows shall be provided as specified in Sections 11 and 74 of the Technical Specification.

Structural calculations of the design shall be prepared for all tanks of 100 U.S. gallons and larger. All Tank design drawings shall have their structural calculation submitted with the drawing. Drawings submitted without calculation will be returned "RETURNED, Not Substantially Complete". See the *REVIEW OF DRAWINGS AND ENGINEERING CALCULATIONS* Subsection in Section 100 of the Technical Specification.

1 **78.5 LIST OF TANKS**

TABLE 78-1
List of Tanks

No. Required	Tank Description	Location Deck	Frame Ref.	End	Capacity in U.S. Gals at 95%	Head or Pressure Rating (psi)
1	Main Fuel Oil #1	Below EOS	TBDC	1-2	39,500	-
1	Main Fuel Oil #2	Below EOS	TBDC	1-2	22,500	-
1	Fuel Overflow	Below EOS	TBDC	1-2	5,000	-
1	Fuel Day	Below EOS	TBDC	2	4,500	
2	Used Oil Holding (see Section 70 of the Technical Specification for additional installation requirements)	Engine Room	TBDC	Both	1,000	-
2	Oily Water Holding	Engine Room	TBDC	Both	1,000	-
2	Jacket Water Holding	Engine Room	TBDC	Both	500	-
2	Main Engine Lube Oil	Reduction Gear Room	TBDC	Both	1,000	-
2	Miscellaneous LO Storage	Engine Room	TBDC	Both	70	-
2	S/S Diesel Gen LO Storage	Engine Room	TBDC	Both	160	-
2	JW Treatment Storage	Engine Room	TBDC	Both	70	-
2	Bilge Degreaser Storage	Engine Room	TBDC	Both	70	-

TABLE 78-1

List of Tanks

No. Required	Tank Description	Location Deck	Frame Ref.	End	Capacity in U.S. Gals at 95%	Head or Pressure Rating (psi)
2	Air Compressor, Purifier, LO Storage	Engine Room	TBDC	Both	70	-
2	Reduction Gear LO Storage	Reduction Gear Room	TBDC	Both	300	-
2	Stern Tube LO Storage	Engine Room	TBDC	Both	70	-
2(2)	CPP Hydraulic Oil Reservoir	Reduction Gear Room	TBDC	Both	To be determined by the PSI Contractor	-
2(2)	CPP Drain	Reduction Gear Room	TBDC	Both	To be determined by the PSI Contractor	-
2(2)	CPP Storage	Reduction Gear Room	TBDC	Both	To be determined by the PSI Contractor	-
2(2)	CPP Hub Oil	TBDC	TBDC	Both	To be determined by the PSI Contractor	-
1	Emergency Gen. F.O.	Sun	TBDC	1	500	-
1	Purifier Sludge	Engine Room	TBDC	TBDC	TBDC	-
2	Potable Water Storage	Tank Room	TBDC	Both	9,000	-
2	Sewage Holding	Tank Room	TBDC	Both	9,000	-

TABLE 78-1

List of Tanks

No. Required	Tank Description	Location Deck	Frame Ref.	End	Capacity in U.S. Gals at 95%	Head or Pressure Rating (psi)
1	Hi-Fog Water Mist Fire Suppression System/Back-flush Fresh Water Storage	Reduction Gear Room	TBDC	1	4500	-
1	Sewage Lift Station	Engine Room	TBDC	1	TBDC	-
1	Gray Water Lift Station	Tank Room	TBDC	1	TBDC	-
1	Potable Water Pressure	Tank Room	TBDC	2	TBDC	TBDC
2	Steering Gear Hydraulic Storage	Steering Gear Room	TBDC	Both	TBDC	-
2	Steering Gear Hydraulic Oil Reservoir	Steering Gear Room	TBDC	Both	TBDC	-
2	Stern Tube Oil Head	TBDC	TBDC	Both	To be determined by the PSI Contractor	-
2	Stern Tube Oil Settling	Tank Room	TBDC	Both	To be determined by the PSI Contractor	-
2	Propeller Shaft Fwd Seal Oil Tank	Tank Room	TBDC	Both	To be determined by the PSI Contractor	-
2(1)	Main Engine SCAC FW Cooling Expansion Tank	Engine Room	TBDC	Both	To be determined by the PSI Contractor	-

TABLE 78-1

List of Tanks

No. Required	Tank Description	Location Deck	Frame Ref.	End	Capacity in U.S. Gals at 95%	Head or Pressure Rating (psi)
3(1)	Expansion Tank SSDG FW Cooling	Engine Room	TBDC	Both	To be determined by Ships Service Diesel Generator Contractor	-
1	Head Tank, Hot Water Heating System	Sun	TBDC		TBDC	-
2	Starting Air Receivers	Engine Room	TBDC	2	TBDC	TBDC
1	Ship's Service Air Receiver	Engine Room	TBDC	2	TBDC	TBDC
1(1)	Control Air Receiver	Engine Room	TBDC	2	To be determined by the PSI Contractor	To be determined by the PSI Contractor
2	Whistle Air	Bridge Deck	TBDC	TBDC	TBDC	150 psig

TBDC: To Be Determined By Contractor

(1) Supplied by WSF Owner Furnished Equipment (OFE); installed by Contractor.

(2) Design guidance supplied by WSF; fabricated and installed by Contractor.

78.6 SPARE PARTS AND INSTRUCTION MANUALS

Provide a list of recommended spare parts and special tools for those items which are contractor furnished, together with parts lists and instruction manuals necessary to maintain and service provided equipment and accessories in accordance with the requirements of Sections 86 and 100 of the Technical Specification.

78.7 TESTS, TRIALS AND INSPECTIONS

Tests and/or trials shall be in accordance with this Section and Section 101 of the Technical Specification. Tanks vented to the atmosphere shall be tested hydrostatically to the

maximum height the liquid may rise in the vent or overflow, in accordance with USCG regulations. Pressure tanks shall be tested hydrostatically to 1½ times the maximum allowable working pressure (MAWP). See TABLE 101-1 in Section 101 of the Technical Specification

Inspections shall be performed as defined in this Section and in Sections 1 and 2 of the Technical Specification.

78.8 PHASE II TECHNICAL PROPOSAL REQUIREMENTS

The deliverables required by Section 100 of the Technical Specification and the Authoritative Agencies, shall be provided during the Phase II Technical Proposal stage of Work in accordance with the requirements of Section 100 of the Technical Specification.

78.9 PHASE III DETAIL DESIGN AND CONSTRUCTION REQUIREMENTS

The following deliverables, in addition to other drawings required by Section 100 of the Technical Specification and the Authoritative Agencies, shall be provided during the Phase III Detail Design stage of Work in accordance with the requirements of Section 100 of the Technical Specification:

A. GHS Tank Volume Table.

B. Structural calculations for design of tanks.

C. Tank Sounding Tables – provide sounding tables for **all** tanks.

A ***Tank Label List*** shall be part of Drawing No. 9001-024-01 - *Notices, Nameplates and Markings Arrangement & Details* required by Section 100 of the Technical Specification and shall be produced in accordance with the requirements of Section 24 of the Technical Specification.

(END OF SECTION)